DEFORMATION OF THE SADDLE POINT FROM HEAVY ION INDUCED FISSION FRAGMENT ANGULAR DISTRIBUTIONS

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Determining the potential energy landscape in the deformation space continues to be a challenging problem [1]. There has been a long standing discrepancy [2] between the deduced effective moment of inertia ($\Im_{eff}$), which is related to the saddle point shape, from the analysis of α induced fission reactions and the values predicted by the models. Though the agreement between the rotating finite range model (RFRM) [3] predictions and the experimental results (see Fig. 1) is good for high ($\frac{Z^2}{A}$), the deduced $\Im_{eff}$ values are more close to rotating liquid drop model (RLDM) [4] predictions for low ($\frac{Z^2}{A}$). There were no experimental data for intermediate values of ($\frac{Z^2}{A}$). Further, these models are not well tested in heavy-ion induced fusion-fission reactions involving large angular momentum values.

In the present work, the $\Im_{eff}$ values are obtained from detailed statistical model analysis of the measured fission fragment angular distributions for ^{19}F + ^{188,192}Os,^{194,198}Pt systems. The multichance nature of fission has been taken into account explicitly and the calculation is constrained by fitting the measured evaporation residues and fission cross-sections along with the prefission neutron multiplicity data from systematics. The existing literature data have been also reanalyzed to cover a wide range of ($\frac{Z^2}{A}$). Though the values of the extracted $\Im_{eff}$ are consistently larger than those predicted by the RFRM, their trend is found to agree with that of the RFRM over the whole range of ($\frac{Z^2}{A}$) studied (see Fig. 1, X-axis is correct for finite spin of the fissioning nuclei). These results will provide a useful constraint for different models, which are used to predict the fission barriers and the shapes for shell stabilized super heavy nuclei.

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